Puget Sound Area Long Range Study

Bonneville Power Administration

Transmission Business Line

September 2000

Introduction

- Northern Puget Sound Area Existing System.
  - PSE/SCL/SPUD Generation Locations.
  - 500/230 KV Transformer Locations.
  - Puget Sound Area Load Level.

Recap Dec. 8, 1999 Public Meeting

Status of NI Phase 2 Reinforcements

BPA Additions and Work	Energization Date
Snoking 230-kV bus sectionalizing & new terminal	Completed
Line work to terminate Maple Valley-Snoking #2 line	Completed
Snohomish 230-kV bus sectionalizing	Completed
Maple Valley 230-kV terminal for MV-Snoking #2 line	Completed
Monroe 230-kV breaker work	Completed
Monroe 500-kV breaker additions	Completed
Move the Christopher tap to Tacoma-Covington #2 line	Completed

Seattle City Light Additions and Work	Energization Date
Maple Vly-Snoking 230-kV #1 line, clear right-of-way	Completed
Add protection scheme at Broad Street to protect cables	Completed
Raise tower on Maple Valley-Snoking 230-kV #1 line	Completed
Rerate Maple Vly-Snoking 230-kV #1 line	Completed
Maple Vly-Snoking 230-kV #2 line, clear right-of-way	Completed

Puget Sound Energy Additions and Work	Energization Date
Sammamish 230-kV bus sectionalizing	Completed
Midway-Obrien 115-kV line sag upgrade	Completed
Dierenger-White River 115-kV line sag upgrade	Completed
Christopher-Obrien 230-kV line, bundle spans	Completed
Talbot Hill-Paccar 115-kV line sag upgrade	Completed
Lakeside-Talbot Hill 115-kV #1 and #2 line sag upgrade	Procurement/Permitting
Cottage Brook-Snoqualmie 115-kV line sag upgrade	Procurement
Horse Ranch-Bothell 230-kV line, bundle spans	Completed

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Westside NI Capacity Comparison

Comparison of 1999 and 2000 Summer All Lines In Service with NI Phase 2 Upgrades Completed.							
					NI N-S Transfer Limit		
FISCAL YEAR	PSE GEN.	SCL GEN.	Critical Contingency	Limiting Facility	1999	2000	DIFFERENCE
					86 F	86 F	
1999	1000	650	B/D Snoking Section 2 & Snoking Tap 230	PSE Bothell-Sammamish 230	2145		
2000	1000	650	BF Horseranch 230	BPA Murray-Sedro NT 230		2870	725
1999	1000	380	BF Bothell Section 4 230	BPA Bothell-Snohomish #1 230	2279		
2000	1000	380	BF Horseranch 230	BPA Murray-Sedro NT 230		2672	393
1999	1000	100	BF Bothell Section 4 230	BPA Bothell-Snohomish #1 230	1679		
2000	1000	100	BF Horseranch 230	BPA Murray-Sedro NT 230		2467	788

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Long Range Alternatives Discussed

1	Raver-Echolake 500-kV #2
	Snoking 500/230-kV Tx (Tap Monroe-Echolake 500-kV)
2	Echolake Tap On Raver-Schultz 500-kV
	Snoking 500/230-kV Tx (Tap Monroe-Echolake 500-kV)
3	Echolake Tap on Raver-Schultz 500-kV
	Echolake-Snoking 500-kV
	Snoking 500-kV Tx
4	Echolake Tap On Raver-Schultz 500-kV
	Monroe-Snoking 500-kV
	Snoking 500-kV Tx
5	Raver-Maple Valley 500-kV
	Maple Valley 500/230-kV #2 Tx
6	Raver-Echolake 500-kV #2
	Echolake-Snoking 500-kV
	Snoking 500/230-kV Tx
7	Raver-Echolake 500-kV #2
	Monroe-Snoking 500-kV
	Snoking 500/230-kV Tx
8	Raver-Echolake 500-kV #2
	Echolake-Monroe 500-kV #2
	Snoking 500/230-kV Tx (Tap Monroe-Echolake 500-kV #1)
9	Raver-Monroe 500-kV
	Snoking 500/230-kV Tx (Tap Monroe-Echolake 500-kV #1)
Other Options Considered	
A	Sectionalizing 230/115-kV system
B	Adding phase-shifters
C	Rebuild Maple Valley-Sammamish-Monroe to 500-kV
	Develop Novelty Hill Substation
	Add 500/230-kV Tx

Study Objectives

- West side NI south to north minimum firm capacity of 1270MW for winter and spring load conditions.
  - Includes Canadian Entitlement Treaty Obligation.
- West side NI north to south transfer level of 2850MW for summer load conditions.
- Meet load-service requirements.
- Robust system for generation excursions.

Study Assumptions

- FY 2006 System Conditions.
- NI Phase 2 Reinforcement completed.
- New generation integration: 10/2001: Fredrickson 250MW.
- Multiple generation levels, multiple seasons & multiple transfer levels and directions.

		Custer-Ingledow	PSE/SCL/SPUD Gen.
WINTER			
Peak	S-N	1200 - 1700	600/400/125
Peak	S-N	1200 - 1700	300/200/60
Abnormal	S-N	700 - 1270	950/520/125
SPRING			
Peak	S-N	1370 - 1800	260/100/40
SUMMER			
Peak	N-S	2350 - 2850	1150/650/125
Peak	N-S	2350 - 2850	1150/100/40

Options Studied

- First twelve options considered.
  - Raver-Echo Lake #2 Vs Schultz-Echo Lake.
    - Next 500/230-kV transformer need date after Snoking 500/230-kV transformer addition.
    - QV analysis for Group 1 Options 1-4.
  - Winter performance.
- Narrowed down to eight options.
  - Performance.

Analysis of Options

- Comparison of options (W1, W4, P44).
  - Performance.
  - Facility upgrades needed.
  - Present worth analysis.
  - Robustness test for outages.
- Preferred option: W1